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(71) Applicants *(for all designated States except US)*: **SHELL OIL COMPANY** [US/US]; Department of Intellectual Property, One Shell Plaza, P.O. Box 2463, Houston, TX 77252-2463 (US). **MIGLIN, Maria, Therese** [US/US]; 23314 Grand Springs Drive, Katy, TX 713203 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **MATZAKOS, Andreas, Nicholas** [US/US]; 2115 Parkview Lane, Missouri City, TX 77459 (US). **WELLINGTON, Scott, Lee** [US/US]; 5109 Aspen Street, Bellaire, TX 77401 (US). **CLOMBURG, Lloyd, Anthony** [US/US]; 18207 Widcombe Drive, Houston, TX 77084 (US). **VEENSTRA, Peter** [NL/US]; 8507 Chipping Rock Drive, Sugar Land, TX 77479 (US). **MUNSHI, Abdul, Wahid** [US/US]; 12635 S. Dairy Ashford, Houston, TX 77099 (US). **JEAN, Rong-her** [US/US]; 5810 Wilkins Lane, Sugar Land, TX 77479 (US). **ELLIOTT, Glenn, William** [US/US]; 148 Westover Drive, Akron, OH 44313 (US). **GROENEVELD, Michiel, Jan** [NL/NL]; Volmerlaan 8, NL-2288 GD, Rijswijk, NL-2288 The Netherlands (NL).

(74) Agent: **TSANG, Y., Grace**; SHELL OIL COMPANY, One Shell Plaza, P.O. Box 2463, Houston, TX 77252-2463 (US).

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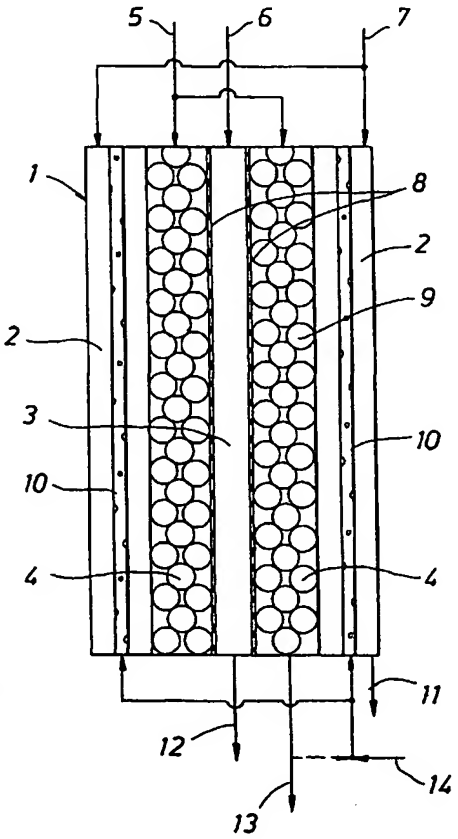
(54) Title: APPARATUS AND PROCESS FOR PRODUCTION OF HIGH PURITY HYDROGEN



(57) Abstract: The invention relates to a new and improved process and apparatus for the production of high purity hydrogen by steam reforming. The apparatus is an integrated flameless distributed combustion-membrane steam reforming (FDC-MSR) or reactor for steam reforming of a vaporizable hydrocarbon to produce H_2 and CO_2, with minimal CO, and minimal CO in the H_2 stream. The flameless distributed combustion drives the steam reforming reaction which pro-vides great improvements in heat exchange efficiency and load following capabilities. The reactor may contain multiple flameless distributed combustion chambers and multiple hydrogen-selective, hydrogen-permeable, membrane tubes. The feed and reaction gases may flow through the reactor either radially or axially. A further embodiment of the invention involves producing high purity hydrogen by dehydrogenation using an integrated FDC -membrane de-hydrogenation reactor. A still further embodiment of the invention involves a zero emission hybrid power system wherein the produced hydrogen is used to power a high-pressure internally manifolded molten carbonate fuel cell. In addition, the design of the FDC-SMR powered fuel cell makes it possible to capture good concentrations of CO_2 for sequestration or use in other processes.

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